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## Space Weather Forecast

Issued on Saturday 22 March 2025 at 00:37 Local

**This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales <https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales>**

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**Space Weather Forecast Headline: Chance of isolated Moderate class flares. G1-G2/Minor-Moderate Storms likely Day 1 (22 Mar), with a chance of G1-G2 Days 2-4 (23-25 Mar), due to faster solar wind streams and/or Coronal Mass Ejection influences.**

### Analysis of Space Weather Activity over past 24 hours

**Solar Activity:** Solar activity reached Moderate levels following an isolated Moderate-class flare at 21/1558UTC, from a small bipolar region in the southwest.

There are currently fourteen sunspots on the Earth facing disc, thirteen numbered and one un-numbered. Despite the large amount of sunspots, the vast majority are relatively small and magnetically simple and either stable or in slight decay. The largest group is a modest-size bipolar group located toward the northwest limb. Two other newly numbered bipolar groups have also rapidly emerged in the northwest quadrant in recent hours.

A faint partial halo CME (coronal mass ejection) was observed from near centre disc following the Moderate flare mentioned above. This is currently being analysed, but seems likely to have an Earth-directed component.

**Solar Wind / Geomagnetic Activity:** Solar winds were between background and slightly elevated levels until around 21/1700 UTC, after which it increased steadily 450-550 km/s. The Interplanetary Magnetic Field (IMF) was initially weak but increased steadily to moderate levels, before becoming persistently strong after 21/1700 UTC, with brief peaks of very strong. The north-south component followed a similar pattern to the IMF, later becoming strongly variable. Geomagnetic activity was Quiet to Active (Kp 1-4), then increased to G1/Minor Storm 21/1800-2400 UTC.

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) was at background levels with no solar radiation storms observed.

### Four-Day Space Weather Forecast Summary

**Solar Activity:** Generally Low activity is expected, with a chance of further isolated M-class flares.

**Solar Wind / Geomagnetic Activity:** Further potential glancing CME influences mean that confidence in the forecast is lower than usual.

Solar winds are expected to continue at enhanced slightly elevated to elevated levels, initially from ongoing CME influence, then later due to anticipated connection with a coronal hole in the western hemisphere. There is also potential for another CME glance later Day 1. Enhanced winds are likely to persist into Day 2 (23 Mar) before perhaps easing into Day 3 and 4 (24 and 25 Mar). However, later on Day 4 (25 Mar) a large coronal hole may begin to become geo-effective, increasing solar winds again.

G1-G2/Minor-Moderate storms are likely on Day 1 (22 Mar), with a chance of further G1-G2 periods on Days 2-4 (23-25 Mar) due to faster streams of solar wind and/or further possible CMEs influences.

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) is expected to persist at background levels, with a slight chance of enhancement from any larger flares.

## Geomagnetic Storms

| Geomagnetic Storm           | Level    | Past 24 Hours<br>(Yes/No) | Day 1<br>(00-24 UTC) | Day 2<br>(00-24 UTC) | Day 3<br>(00-24 UTC) | Day 4<br>(00-24 UTC) |
|-----------------------------|----------|---------------------------|----------------------|----------------------|----------------------|----------------------|
| Probability<br>(Exceedance) |          |                           | (%)                  | (%)                  | (%)                  | (%)                  |
| Minor or Moderate           | G1 to G2 | Yes                       | 80                   | 50                   | 50                   | 40                   |
| Strong                      | G3       | No                        | 20                   | 10                   | 10                   | 5                    |
| Severe                      | G4       | No                        | 5                    | 1                    | 1                    | 1                    |
| Extreme                     | G5       | No                        | 1                    | 1                    | 1                    | 1                    |

## Radio Blackouts - X-Ray Flares

| X-Ray Flares | Level              | Past 24 Hours<br>(Yes/No) | Day 1<br>(00-24 UTC) | Day 2<br>(00-24 UTC) | Day 3<br>(00-24 UTC) | Day 4<br>(00-24 UTC) |
|--------------|--------------------|---------------------------|----------------------|----------------------|----------------------|----------------------|
| Probability  |                    |                           | (%)                  | (%)                  | (%)                  | (%)                  |
| Active       | R1-R2<br>(M Class) | Yes                       | 35                   | 30                   | 30                   | 30                   |
| Very Active  | R3-R5<br>(X Class) | No                        | 1                    | 1                    | 1                    | 1                    |

## Solar Radiation Storms (High Energy Protons)

| Radiation Storms                                                                                           | Level<br>(cm <sup>-2</sup> sr <sup>-1</sup> s <sup>-1</sup> ) | Past 24 Hours<br>(Yes/No) | Day 1<br>(00-24 UTC) | Day 2<br>(00-24 UTC) | Day 3<br>(00-24 UTC) | Day 4<br>(00-24 UTC) |
|------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------|----------------------|----------------------|----------------------|----------------------|
| Probability<br>(Exceedance)                                                                                |                                                               |                           | (%)                  | (%)                  | (%)                  | (%)                  |
| Active                                                                                                     | ≥ S1                                                          | No                        | 5                    | 5                    | 5                    | 5                    |
| Very Active                                                                                                | ≥ S3 *                                                        | No                        | 1                    | 1                    | 1                    | 1                    |
| * S3 ≥ 10 MeV ≥ 1000 pfu and/or 50 MeV ≥ 10pfu. (pfu = cm <sup>-2</sup> sr <sup>-1</sup> s <sup>-1</sup> ) |                                                               |                           |                      |                      |                      |                      |